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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/730,398
Filing Date: December 08, 2003
Appellant(s): BIELER ET AL.

David L. Suter
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed June 16, 2008 appealing from the Office action mailed July 16, 2007.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

No amendment after final has been filed.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

5,527,628	ANDERSON	6-1996
5,520,752	LUCEY	5-1996

Gibson, A.W.; Choi, S.L.; Subramanian, K. N.; Bieler, T. R. "Issues regarding microstructural coarsening due to aging of eutectic tin-silver solder" Design & Reliability of Solders and Solder Interconnections, Proceedings of a Symposium held during the TMS Annual Meeting, Orlando, Fla., Feb. 10-13, 1997 (1997), 97-103. Editor(s): Mahidhara, Rao K. Publisher: Monerals, Metals & Materials Society, Warrendale, Pa.

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

The factual inquiries set forth in Graham v. John Deere Co., 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Appellant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

Claims 20-24, 27-33, 36, 37, 39-45, 47-53, 55-59, and 62 are rejected under 35 U.S.C. § 103 as being unpatentable over USP 5527628 to Anderson et al (PTO-1449).

Anderson discloses the feature including steps of combining a solder with the components of the intermetallic phase such as Cu, Ag, and/or Sn to form a mixture (col. 2, lines 60-64; col. 5, line 59 to col. 6, line 12). The mixture can be formed as composite solder wire, solder sheet, solder ingot, and solder powder (col. 5, lines 60-62). The composite solder melt can be chill cast (col. 5, line 67 to col. 6, line 2) to form an ingot which could be used to form ultrafine solder powder by melt atomization (col. 6, lines 14-15). But, Anderson does not disclose the claimed cooling rate and does not explicitly disclose the intermetallic particle size. Anderson discloses the solder powder is produced by conventional atomization techniques (col. 6, lines 14-50) which is known in the art of cited reference that the cooling rate is at least 100 °C/sec. The examiner takes the official notice that conventional atomization methods would have the cooling rate at least 100 °C/sec. Moreover, in paragraph bridging col. 6 and 7, Anderson discloses slow cooling rate would coarsening the intermetallic phases. Since the instant claimed solder elements and atomization method are overlapped by the cited reference; consequently, the particle size as recited in the instant claims would have been inherently possessed by the teaching of the cited reference. Furthermore, Anderson discloses the intermetallic phases are dispersed in the ultrafine solder powder which has size less than 25 μm (col. 6, lines 3-44). Therefore, the burden is on the appellant

to prove that the product of the prior art does not necessarily or inherently possess characteristics attributed to the claimed product.

In re Best, 195 USPQ, 430 and MPEP § 2112.01.

> "Where the claimed and prior art products are identical or substantially identical in structure or composition, or are produced by identical or substantially identical processes, a prima facie case of either anticipation or obviousness has been established, In re Best, 195 USPQ 430, 433 (CCPA 1977). 'When the PTO shows a sound basis for believing that the products of the appellant and the prior art are the same, the appellant has the burden of showing that they are not.' In re Spada, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990). Therefore, the prima facie case can be rebutted by evidence showing that the prior art products do not necessarily possess the characteristics of the claimed product. In re Best, 195 USPQ 430, 433 (CCPA 1977)."

Claims 25, 26, 38, 46, and 61 are rejected under 35 U.S.C. § 103 as being unpatentable over USP 5527628 to Anderson et al (PTO-1449) in view of USP 5520752 to Lucey, Jr. et al.

The claimed subject matter as is disclosed and rejected above by Anderson except for the different intermetallic phases and cooling methods. However, Lucey in col. 3, line 64 to col. 4, line 5 teaches the other claimed intermetallic phases in the eutectic solder alloys and their cooling methods which are conventional methods to produce conventional solders. It has been held that combining known ingredient having known functions, to provide a composition having the additive effect of each of the known functions is within realm of performance of ordinary skill artisan. In re Castner, 186 USPQ 213 (217). The use of conventional materials to perform their known functions in a conventional process is obvious. In re Raner, 134 USPQ 343 (CCPA 1962).

Claims 34, 35, 54, and 60 are rejected under 35 U.S.C. § 103 as being unpatentable over USP 5527628 to Anderson et al (PTO-1449) in view of Gibson et al (PTO-1449).

The claimed subject matter as is disclosed and rejected above by Anderson except for the volume of the intermetallic phase. However, Gibson in abstract teaches 20 volume percent intermetallic phase would improve fatigue resistance. Therefore, it would have been obvious to one having ordinary skill in the art of the cited references at the time the invention was made to employ the teachings as taught by Gibson in order to improve the solder fatigue resistance.

(10) Response to Argument

Appellant's declaration filed December 12, 2006 and arguments filed June 16, 2008 have been fully considered but they are not persuasive.

Appellants argue in declaration and paragraph bridging pages 8-9 of brief that

> 5. The '628 patent sets forth erroneous compositional ranges, including an erroneous eutectic composition for the Sn-Ag-Cu system. This error has been recognized by those of skill in the art, including various third parties. The Moon article (C) acknowledges this error and further states on Pages 1122 to 1123 that "[p]reliminary thermodynamic calculations performed by one of the authors [ ] and reported by Miller et al. [B] predicted a ternary eutectic...an error was made in the conversion from atomic to weight % conversion by Miller et al."
>
> 6. The Moon article (C) reports that the ternary eutectic composition for the Sn-Ag-Cu system is 3.5 wt. % Ag - 0.9 wt. % Cu – 95.6 wt. % Sn, with a eutectic temperature of approximately 217°C, which is now widely accepted in the art.
>
> 7. As such, those of skill in the art recognize that the compositional ranges for the eutectic Sn, Ag, and Cu system set forth in the '628 patent are incorrect and the '628 patent does not teach a " eutectic lead-free solder composition.

". But, it is immaterial because examples of the cited reference are given by way of illustration and not by way of limitation. In re Widmer, 353 F.2d 752, 757, 147 USPQ 518, 523 (CCPA 1965), In re

Boe, 148 USPQ 507 (CCPA 1966), and In re Snow, 176 USPQ 328. Furthermore, appellants' attention is directed to col. 2, lines 60-64 of Anderson below:

> In one embodiment of the invention, the Pb-free solder consists essentially of about 3.5 to about 7.7 weight % Ag, about 1.0 to about 4.0 weight % Cu and the balance essentially Sn.

Ordinary skill artisan has no need to modify the Cu-Ag-Sn alloy composition since instant claimed composition (components of eutectic or near-eutectic, appealed claim 20, for example) is overlapped by Anderson.

Appellants' argument in page 10 of instant remarks is noted. But, the In re Yale is misplaced because Anderson discloses the claimed "near-eutectic Sn-Ag-Cu" composition (see col. 2, lines 60-64 pasted in paragraph immediately above.

Appellants argue that

> ~~Notwithstanding the deficiencies in its teachings,~~ *Anderson* does not describe or suggest the claimed methods of producing a composite solder having an intermetallic component homogeneously distributed through a eutectic or near-eutectic matrix solder, where the intermetallic component is selected to have a density within 10% of the density of the matrix solder and is present at greater than or equal to 10 volume %. ~~The density and particle size of~~ "

But, the components of the Sn-Ag-Cu solder are same as intermetallic components, so the density of intermetallic components is within 10% of the matrix solder if it is not the same. Moreover, the claimed intermetallic compound such as Cu_6Sn_5 is taught by Anderson (col. 3, lines 17-25 and col. 4, lines 5-11).

Appellants' argument in page 12 of instant remarks is noted. But, Anderson discloses the minimum Ag content is about 3.5 wt.% (col. 2, lines 61-64) not 0.2 wt.% as disclosed by Moon.

Appellants' argument in page 14 of instant remarks is noted. The intermetallic compound Sn_6Cu_5 is formed in-situ in the Sn-Ag-Cu solder (col. 6, lines 3-15). Said intermetallic compound has same Sn and Cu components as the solder Sn-Ag-Cu solder. Anderson discloses the melting temperature of said solder is up to 15°C above Sn-Ag-Cu ternary eutectic melting temperature (217°C, col. 4, lines 15-23 and col. 5, lines 3-12).

Appellants' argument in paragraph bridging pages 14-15 of instant brief is noted. But, the claimed solder composition and processing steps are overlapped by Anderson for reason set forth in the rejection. Appellants fail to show the claimed particle size of intermetallic compound would not have been inherently possessed by the solder of Anderson.

Appellants' argument with respect to Lucey is noted. But, Lucey discloses solder components and intermetallic compounds overlapped Anderson's and instant solder components and intermetallic compounds (Lucey -Figure 5, col. 3, line 64 to col. 4, line 5, and claim 1).

Appellants' argument with respect to Gibson is noted. However, Gibson teaches adding 20 vol.% Cu_6Sn_5 intermetallic composite to Sn-Ag eutectic solder composition (abstract and page 98, right-column, second paragraph). The solder is for automotive electronic (abstract). The solder joint is formed by heating to less than 270°C (Figure 2) not excess of 310°C as alleged.

~~composite solder, such as recited in Claim 54~~. *Anderson* merely describes heating the solder to a melt pour temperature of about 300°C. Col. 6, l. 32. This temperature is insufficient to fully melt the elements of a Sn, Ag, Cu system, where the melting temperatures of Sn, Ag and Cu are about 232°C, about 962°C, and about 1085°C, respectively. As such, Claim 54 requires heating to at least 1085°C for the comparative Sn-Ag-Cu system, which is not described or suggested by *Anderson*. *Gibson* does nothing to remedy the deficiencies of the *Anderson* reference. ~~The~~ "

Appellants argue that "

But, it is found inconsistent with teaching of cited references and instant appealed claim 54. Both Anderson (217°C + 15°C max, col. 5. lines 3-12) and Gibson (less than 270°C, figure 2) teach to melt solder with components as claimed below 300°C. Moreover, none of any appealed claims requires to melt the components at temperature at least 1085°C. Arguendo such temperature is required by the recited components which would have been inherently possessed by the solder components.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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Primary Examiner, Art Unit 1793
August 27, 2008

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